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Annex I

Potential Targets in Electric Power, Heavy Industry, Transportation, Petroleum Storage, and the Port of Haiphong

Introduction

Industry in North Vietnam in absolute terms is small, and the economy remains predominantly agricultural. About 80 percent of the labor force is engaged in agriculture, and it is estimated that in 1964 the value of agricultural production accounted for almost half of North Vietnam's gross national product (GNP).

The Democratic Republic of Vietnam (DRV) has initiated an industrialization program that is relatively ambitious in comparison to past efforts and in comparison to the industrial programs of most other underdeveloped countries in Asia. New modern industries in North Vietnam include the machine-building industry, the chemical industry, food processing industries such as rice milling and sugar refining, and other light industries such as enamelware, paper, and soap. Industries that existed in North Vietnam before the Communist takeover, such as cement and textiles, have been expanded.

North Vietnam's modern industry and transportation facilities -- which have been rehabilitated and expanded with extensive Sino-Soviet aid -- are concentrated in a relatively small area and are highly dependent upon imports of machinery and raw materials. The interdiction of these facilities would drastically curtail industrial production and would constitute a psychological blow to the regime.

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I. Electric Power

Industry is concentrated within a small rectangular area bounded by the four cities of Haiphong, Thai Nguyen, Phu Tho, and Nam Dinh. Serious damage to a few key powerplants could effectively deny the Vietnamese the power that is essential to industry. The most important targets would be the eight large interconnected plants that make up the main electric power grid. These eight powerplants account for about 78 percent of total national electric power capacity and serve about 90 percent of North Vietnam's industry, including the important industrial and urban areas of Hanoi, Haiphong, Viet Tri, Thai Nguyen, Nam Dinh, and Hon Gay - Cam Pha. It would be essential to neutralize all of the plants in the grid in order to deny effectively electric power to the grid system; otherwise, those plants still in production could partly compensate for production from plants made inoperative. The relative importance of each of the eight plants to the main grid is indicated below:

<u>Thermal Powerplant</u>	<u>Installed Capacity (Thousand Kilowatts)</u>	<u>Percentage Contribution to Main Grid</u>
Hanoi	32.5	24
Thai Nguyen	24.0	18
Viet Tri	16.0	12
Haiphong Cement Plant	12.0	9
Uong Bi	24.0 a/	18
Haiphong	5.5	4
Hon Gay	13.0	10
Nam Dinh	7.5	5
Total	134.5	100

a. The Uong Bi Thermal Powerplant is still under construction, which could be accelerated to raise capacity initially to 36,000 kilowatts in the event of a power shortage. With a planned total capacity of 48,000 kilowatts, it will be North Vietnam's largest thermal electric powerplant.

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Serious damage to these important electric powerplants would have an immediate effect in curtailing North Vietnam's industrial production. A brief description of the individual plants follows:

A. Hanoi Thermal Powerplant

1. Description: Largest operating powerplant in North Vietnam. Main target area is roughly 550 feet long by 250 to 300 feet wide, with an extension of 350 feet consisting of related buildings. It includes a 5-stack boiler house, other multistory buildings, 8 support buildings, coal yard, possible transformer yard, auxiliary diesel generator, and POL storage. Served by 3 water lines to the Red River; has a buried 100-ton water storage tank.
2. Location: 21-02-35N/105-50-51E; on northern side of city, within 200 meters of Lake Tay Ho (Ho Truc Bach) to the west and inner dike on the south bank of the Red River to the north. Railroad about 600 meters distant at nearest point. Accessible only through city streets, along which normally dense city settlement exists.

B. Thai Nguyen Thermal Powerplant

1. Description: A new plant which will serve the iron and steel plant now under construction. Planned capacity is 36,000 kw, and present generating capacity is 24,000 kw. The plant is served by a rail spur.

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2. Location: 21-33-25N/105-52-15E; on South bank of Song Cau near village of Quang Vinh, about 3 kilometers northwest of Thai Nguyen. Surroundings consist of hills and basins.

C. Viet Tri Thermal Powerplant

1. Description: New plant serving rising industrial complex at Viet Tri. Present capacity 16,000 kw; capacity to be expanded to 24,000 kw. Combination one-stack boilerhouse and generator building. Serves new Viet Tri paper mill, chemical plant, and sugar refinery, in addition to supplying power to the main grid.
2. Location: 21-17-42N/105-25-30E; within compound of Viet Tri Chemical Plant, between the railroad and north bank of the Red River; within 600 meters of the river and about 2 kilometers west of Viet Tri Railroad/Highway Bridge. Accessible by water from mountainous region of the Black River basin.

D. Thermal Powerplant at Haiphong Cement Plant

1. Description: Estimated capacity 12,000 kw; serves cement plant and city. Consists of boilerhouse, generator house, coal storage, and conveyors.
2. Location: 20-51-50N/106-40-25E; located in southern half of cement-plant compound, on the south bank of the Cua Cam. Compound flanked on east by canal 100 meters wide. Approachable by water on north and east and by rail spur on west. Surroundings on west and southwest are moderately built-up, with small ponds, fields, and paddies interspersed.

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E. Uong Bi Thermal Powerplant

1. Description: New plant planned for 48,000 kw, with present generating capacity of 24,000 kw, and a third generator under construction that will raise capacity to 36,000 kw. Will be largest potential contributor to main power grid, as well as important supplier to local coal mining and loading facilities.
2. Location: 21-02-00N/106-47-25E; located outside town of Uong Bi and probably surrounded by discontinuous village-type settlement. Accessible by boat through network of tidal channels connecting Uong Bi area with the estuary of Song Da Back, 5 kilometers to the south.

F. Haiphong Thermal Powerplant

1. Description: Present capacity 6,000 kw; essential for local industrial use and stand-by power. Single L-shaped power house 25 by 50 meters, with coal storage yard, switch and transformer building, and possible water conduit. Barge pier serving plant extends about 270 meters across mudflats to Cua Cam channel.
2. Location: 20-52-15N/106-42-50E; on south bank of Cua Cam, eastern edge of Haiphong. Paddy fields on southwest; area relatively rural except for riverside industrial strip. Plant probably most easily accessible from river.

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G. Nam Dinh Thermal Powerplant

1. Description: The Nam Dinh thermal powerplant was enlarged and rebuilt in 1957 with present capacity at 7,500 kw. It supplies power to the textile plant and to the surrounding urban area. Connection with the main power system via 110 kilovolt line that passes through Phu Ly and extends northward to Hanoi.
2. Location: 20-24-55N/106-10-23E; (located on the southeast side of the textile plant).

H. Hon Gay Thermal Powerplant

1. Description: The Hon Gay thermal powerplant with a capacity of 13,000 kw. supplies power for all coal mining in the area, for the town of Hon Gay, and for the town and port of Cam Pha. The high tension line to Cam Pha is rated at 35 kilovolts. Connection with the main power system is believed to be through Uong Bi by a 110 kilovolt line.
2. Location: 20-56-28N/107-06-50E.

II. Heavy Industrial Plants

The loss of five major heavy manufacturing plants would seriously impair the industrial output of North Vietnam. Loss of these plants would have a psychological impact on the Vietnamese because these modern industrial facilities are a source of great national pride. In particular, severe damage to the Thai Nguyen Iron and Steel Plant would frustrate the regime's plans for an iron and steel industry, a prestige industry that no other country in Southeast Asia yet boasts. The description of the five plants and of a nitrogenous fertilizer plant under construction at Ha Bac is as follows:

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A. Hanoi Engineering Plant

1. Description: Modern plant which was a key Soviet aid project. Work force is about 2,500. This plant is the most important production and repair facility for precision machine tools and light mechanical equipment in North Vietnam. This plant carries considerable prestige among the North Vietnamese as a symbol of advanced technology, although its products are copies of old Soviet models of the late 1940's. There has been no evidence of production of weapons; however, the plant has added 200-300 workhours daily since April 1965. The plant has a potential for manufacturing small arms such as rifles, bazookas, and recoilless rifles but not large weapons or armored vehicles.
2. Location: 21-00-02N/105-49-07E; located on Hanoi-Ha Dong Road in suburban semi-agricultural area of high population density with village adjacent to main compound. Extensive worker housing area across road from principal installation.

B. Thai Nguyen Iron and Steel Plant

1. Description: This plant now under construction by the Chinese, is the most expensive foreign aid project to be built in North Vietnam. Initial capacity will be 100,000 tons of crude steel. Two blast furnaces, a coke battery, and sintering plant are now in operation producing pig iron. By the end of 1965 Thai Nguyen is expected to be producing crude steel and some rolled products. Work force is about 2,000.

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2. Location: 21-33-25N/105-52-15E; there is an extensive construction area, with little village settlement remaining in the immediately surrounding area. This area is scheduled to become the primary heavy industrial center of North Vietnam.

C. Haiphong Cement Plant

1. Description: Rehabilitation of the original French-installed facilities was completed with Soviet, Chinese, and Rumanian aid. This is the only significant cement producer in North Vietnam; supplies nearly all cement for construction activity in the country and has important export capability.
2. Location: 20-51-50N/106-40-25E; on south bank of Cau Cam River. Small number of dwellings in immediate vicinity.

D. Viet Tri Chemical Plant

1. Description: This new plant built by the Chinese and East Germans, produces industrial chemicals and insecticides. The plant is the center of the industrial chemical industry in North Vietnam.
2. Location: 21-10-00N/105-25-10E; compound located between railroad and north bank of Red River, with two villages nearby.

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E. Lam Thao Superphosphate Fertilizer Plant

1. Description: New and largest operating chemical fertilizer plant in North Vietnam, with capacity of 100,000 tons of superphosphate annually. This plant is a major Soviet aid project, and the USSR is believed to be expanding the plant to 150,000 ton capacity.
2. Location: 21-20N/105-17E.

F. Ha Bac Nitrogenous Fertilizer Plant

1. Description: Newest chemical fertilizer plant in North Vietnam, nearing completion and expected to go into operation in 1966. This plant is a major Chinese aid project, probably exceeding in investment and complexity any nitrogen plant the Chinese are known to have built for themselves. Initial capacity is estimated to be 100,000 tons of ammonium nitrate, increasing North Vietnam's total capacity for production of chemical fertilizers by an estimated 40 percent. This plant may be of special importance not only to agriculture, but also for establishing an explosives industry in North Vietnam.
2. Location: Bac Giang - 21-18N/106-12E.

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III. Transportation and Petroleum Storage

The transport system of the DRV is situated and organized in such a way that neutralization of a few key facilities could effectively interrupt <sup>\*</sup> modern transportation. The rail lines all radiate from one center with no alternate rail facilities available for any one of the lines. The country has only one major port for handling large amounts of imports of general cargo and petroleum in bulk. The road system is poor and trucks and gasoline are scarce. The inland water system is underdeveloped and the country has comparatively few ships for inland and coastal water transportation.

Interference with the modern transport system, which carries the major portion of the materials moving to and from modern plants, could be most effectively carried out by the destruction of railroad and highway bridges. Considerable time and foreign assistance would be required to rebuild these bridges. Destruction of key bridges together with the obstruction of the entrance to the port of Haiphong, so that large ships could not enter the port, would do the most damage to the modern transport system. The destruction of the petroleum storage areas at Haiphong and Hanoi would restrict the use of motor, air, and water transportation to some extent.

\* It must be borne in mind that the destruction of rail and road bridges probably would not halt traffic completely for more than a short period of time because traffic can be carried around the breaks by the use of ferries across rivers. Such destruction would, however, seriously impede traffic until the bridges are repaired.

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Selected transportation facilities whose loss would have the most detrimental effects on the economy are listed below:

A. Dap Cau Railroad/Highway Bridge\* over Song Cau, about 20 miles northeast of Hanoi.

1. Description: Four-span, thru-truss bridge, carries 1 railroad track and 2 highway lanes. Loss of this 550' bridge would interdict rail traffic between P'ing-hsiang in China and all major terminals in North Vietnam, and would halt highway traffic temporarily. It would also halt Chinese traffic in transit through North Vietnam to and from Yunnan Province and would disrupt wireline facilities on the bridge.
2. Location: 21-12-18N/106-05-46E. Scattered village-type settlement on both banks, but population density not great.

B. Hai Duong Railroad/Highway Bridge over Thai Binh, about 37 miles east of Hanoi.

1. Description: Destruction of this 1130' bridge would interrupt the movement of domestic, import, and export traffic by rail and road between the port and industrial center of Haiphong and other areas of the country and would interrupt Chinese transit traffic between the port of Haiphong and Yunnan Province. Inland water traffic

\* In order to halt railroad traffic between the Dap Cau bridge and the Chinese border it would be necessary to interdict a number of smaller bridges on this line and possibly to destroy sections of track and moving trains.

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by barge and small craft could continue, however.

2. Location: 20-56-30N/106-21-32E. Located in open rural area.

C. Viet Tri Railroad/Highway Bridge over the Claire, about 50 miles northwest of Hanoi.

1. Description: Four-span, steel, thru-truss bridge, carries 1 railroad track and 2 highway lanes. Loss of this 970' bridge would interrupt nearly all road and rail traffic to and from the newly emerging industrial centers at Viet Tri and Lam Thao and other areas in the northwest. It would also interrupt Chinese traffic to and from Yunnan Province.

2. Location: 21-17-54N/105-26-57E. Riverside rural settlement on both banks of river.

D. Hanoi Railroad/Highway Bridge over Red River (Doumer Bridge)

1. Description: This is North Vietnam's longest bridge, about 5510 feet. Loss would isolate Hanoi temporarily from north and east and would disrupt wireline facilities on bridge. Psychological reaction might be more significant than physical loss of bridge.
2. Location: 21-02-25N/105-51-57E. Urban area on south bank is built up, but north bank is relatively open.

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E. Ninh Binh Railroad/Highway Bridge over Song Day, about 70 miles south of Hanoi.

1. Description: Loss of this 575' bridge would probably interrupt all rail traffic to the southern part of the country and would hamper highway traffic. Military supplies moving southward from the Hanoi area by rail would probably be transferred to highways at this point. Other railroad bridges on this line south of the 20th Parallel have already been bombed.
2. Location: 20-15-37N/105-59-11E. Located on north side of small town, with riverside settlement on north side of bridge.

F. Hanoi Railroad/Highway Bridge over Canal des Rapides, about 6 miles northeast of Hanoi.

1. Description: Loss of this 738' bridge would divide the rail system into two parts, separating Hanoi and Haiphong on the south from the railroad lines to China and Thai Nguyen on the north. It also would isolate the rolling stock repair facilities located in the Gia Lam section of Hanoi from the railroad lines to the north.
2. Location: 21-04-32N/105-54-58E. Some village-type settlements near the bridge, but not in immediate proximity.

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G. Haiphong Petroleum-Products Storage Area

1. Description: This petroleum storage facility, with total capacity of 72,000 metric tons, accounts for about 46 percent of the total petroleum storage capacity in North Vietnam. The loss of this facility would hamper motor and transportation/would impair its ability to be a substantial substitute for rail transportation. Stand-by electrical power would also be reduced.
2. Location: 20-52-25N/106-40-05E; on south bank of Cua Cam Estuary in western outskirts of Haiphong, about 1 kilometer west of the Haiphong Cement Plant. Highway No. 5 and the Haiphong-Hanoi rail line follow along the south side of the compound.

H. Hanoi Petroleum-Products Storage Area

1. Description: The two petroleum-products storage compounds being used in the Hanoi area together account for almost 24 percent of total petroleum storage capacity in the country. The Thanh Am installation is North Vietnam's second major petroleum storage facility, with an estimated capacity of 34,000 metric tons. The Bac Mai storage facility adds another 3,000 metric tons to Hanoi's petroleum

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storage capacity.

2. Location: Thanh Am: 21-03-57N/105-53-48E. Villages nearby, and military camp on opposite side of adjacent military storage area. Bac Mai: 21-00N/105-51 E.

#### I. Port of Haiphong

1. Description: Obstruction of the Channel Maritime leading to the port of Haiphong, together with damage to lighters and other small craft\* and the interruption of traffic on the rail line connecting the Chinese border at P'ing-hsiang with Hanoi, would seriously restrict the movement of foreign trade both by sea and by land. North Vietnam is dependent on foreign trade for its industrial development, and denial of most imports for a period of 2 months or longer would seriously disrupt the industrialization program and cause a drastic fall in industrial output. The country imports all of its petroleum products and steel, practically all of its railroad rolling stock and vehicles, and most of its complex machinery and metal manufactures, spare parts, industrial chemicals, chemical fertilizers, and raw cotton.

\* Lighters and other small craft available to North Vietnam could probably be used to move as much as 50 percent of the import trade (except bulk petroleum and the largest pieces of equipment) from deep-draft vessels anchored outside the channel to the port.

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Nearly all of the seaborne imports and nearly all of seaborne exports, except coal, pass through Haiphong. If denied use of the port by blocking the channel and damage to lighters and other small craft, the regime could shift nearly all of the commodities previously imported by sea to South China ports, in particular to Fort Bayard, from where they could be transported by rail to Hanoi. A possible exception might be petroleum products which could be moved by rail only if China were willing to permit North Vietnam to use tank cars normally employed to transport petroleum to Yunnan Province. If rail transportation between China and North Vietnam were also interrupted, the country then would be deprived of most of its imports. Other ports capable of accommodating oceangoing vessels, in particular Cam Pha and Hon Gay, presently lack the port facilities for handling large quantities of any other type of cargo than coal, and do not have rail connections with the main rail system. In addition, neither truck transport on the road systems connecting Fort Bayard and Hanoi nor North Vietnamese air transport has the equipment, fuel, or facilities to handle more than a small fraction of the

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volume of goods currently imported by North Vietnam. Denial of most of the imports of North Vietnam would soon bring to a halt the construction of industrial projects currently underway. Manufacturing industries, which account for more than 70 percent of gross value of modern industry, probably would be able to continue production for one or two months on the basis of current stockpiles. With the depletion of these stockpiles of materials, such industries as machine-building and textiles would be forced to curtail production drastically unless imports of steel and raw cotton were resumed. The denial of most imports would not significantly effect production of chemicals and cement, because they use local materials for production.

2. Location: 20-52N/106-41E.

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